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(54) Abstract Title
An Input Device

(57) An input device for inputting instructions or data into an apparatus having a display for displaying a plurality of selectable menu items comprises a display controller for controlling the display to display at least one of the menu items as a plurality of subsequentially selectable submenu items, and a selection device for selecting one of the submenu items. The display controller is responsive to the selection of a submenu item displayed as a plurality of subsequentially selectable submenu items to control the display to indicate the selectability of the submenu items. The selector can be used for the subsequent selection of the submenu items and data or instructions are input based on a selected menu item of submenu item.

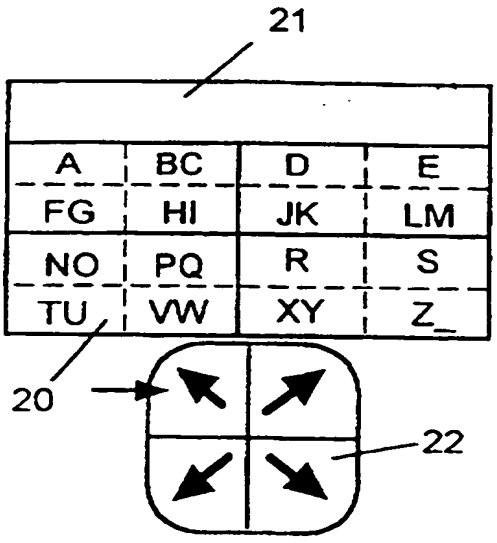

Fig 3a

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AN INPUT DEVICE

The present invention generally relates to an input device for inputting instructions or data to an apparatus. Also, the present invention relates to an apparatus having a user interface allowing a user to select an item from a menu.

In modern information processing apparatuses it is a requirement to provide a convenient user interface for the input of instructions or data. Conventionally for computers and many other devices this is provided as a keyboard. However, not all devices can allow for the provision of a keyboard of a size which can be operated in the conventional manner by depressing keys. For example, in personal digital assistants (PDAs), pagers, mobile phones, and remote control devices, the provision of a keyboard which functions in the conventional manner is not always practical.

The design of an interface allowing a user to input instructions or data into equipment is an important factor in making the equipment more easily usable. It is desirable to make the interface easy for a novice to use and yet suitable for an experienced user to enter instructions or data rapidly.

Marking menus have been developed for use with computers having pointing devices and such a system is disclosed in WO96/39670. Such menus allow a user to enter instructions or data by navigating through menus. The menus are selected in accordance with the pattern of a stroke made by the pointing device. Once a menu has been selected by a particular stroke for example in a particular direction, submenus are then displayed which can be similarly selected. Thus, an experienced

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user can make a number of menu and submenu selections by a complex stroke pattern using the pointing device. However, an inexperienced user has to wait for each menu item selection before the submenu items are displayed and can be selected. Thus, for a novice user the menu selection operation is not quick. Further, the marking menu method can only be used with apparatus having a pointing device allowing the movement of a cursor across a screen. Such an arrangement is thus not appropriate for small hand held devices such as personal digital assistants (PDAs), mobile telephones, pagers, remote controls, or calculators.

In accordance with a first aspect the present invention provides an input device for inputting instructions or data to an apparatus having display means for displaying a plurality of selectable menu items, the input device comprising:

display control means for controlling said display means to display at least one of said menu items as a plurality of subsequently selectable submenu items;

selection means for selecting one of said menu items, said display control means being responsive to the selection of a said menu item displayed as a plurality of subsequently selectable submenu items to control said display means to indicate the selectability of said submenu items, and said selection means being operable for the subsequent selection of one of said submenu items; and

input determining means for determining input instructions or data based on a selected menu item or submenu item.

Thus in accordance with the present invention by displaying the currently selectable menu items as subsequently selectable menu items the user is able to predict the

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next input operation necessary using the selection means in order to select a subsequent menu item.

Each instruction or data unit to be input can be represented by a menu item and the menu items are organised in a hierarchical tree structure such that each menu item or submenu item is displayed as a representation of a set of one or more instruction inputs or data inputs. Thus, said submenu items can be displayed as a plurality of subsequentially selectable submenu items thus displaying a plurality of subsequentially selectable submenu items and in one embodiment all subsequentially selectable submenu items.

Data or instructions can be input automatically when one of the menu items or submenu items comprising no subsequentially selectable submenu items is selected.

In one embodiment the selection means comprises a plurality of key means operable for the selection of corresponding menu items or submenu items. The plurality of key means can be arranged in a spatial manner related to the spatial arrangement of corresponding menu items on the display means. In one such arrangement the display and the keys means can comprise a touch sensitive display wherein the spatial locations of the currently selectable menu items or submenu items displayed on the touch sensitive display comprise the key means. Alternatively the key means comprise a plurality of keys or a single composite key arranged in a layout corresponding to the layout of said currently selectable menu items or submenu items on the display means. In yet another alternative arrangement the key means comprise a plurality of keys, or a composite key arrangement labelled to identify the

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spatial position on said display means which is selectable by the respective key or part of the composite key.

The currently selectable menu items or submenu items are preferably displayed on the display means in a spatial manner about a midpoint. In such an arrangement each of the key means is adapted to display a pointer thereon in a direction corresponding to a direction on the display means from the midpoint to the menu item or submenu item to be selected by the key means.

In an embodiment the display control means is operative in response to the selection of one of the menu items or submenu items displayed as a plurality of subsequentially selectable submenu items to control the display means to highlight the selected menu item or submenu item and to visually indicate that the subsequentially selectable submenu items are currently selectable by said selection means.

In another embodiment of the present invention the display control means is operable to control the display means to display the currently selectable menu items or submenu items about a midpoint, and when a menu item displayed as a plurality of subsequentially selectable submenu items is selected, to redisplay the submenu items of the selected menu item about the midpoint. In this way at each selection by the user the display always displays the items selectable in the current menu about a fixed origin. Thus when the total number of items in the submenus is large and thus there is a large number of submenus, the display of the item to be

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ultimately selected for input is continuously enhanced as the submenus are traversed.

Preferably the submenu items of selected menu items are redisplayed with the same geometrical distribution about the midpoint. Also, preferably the subsequently selectable menu items are displayed in the same geometrical arrangement but in a reduced scale.

In accordance with a second aspect the present invention provides apparatus having a user interface allowing a user to select an item from a menu, the interface comprising:

display means adapted to display a plurality of selectable menu items, at least one of said menu items being displayed as a plurality of subsequently selectable submenu items;

selection means for selecting one of said menu items; and

display control means for controlling said display means in response to the selection of a said menu item displayed as a plurality of subsequently selectable menu items to activate the selectability of said submenu items;

wherein said selection means is operable for the subsequent selection of one of said submenu items.

This aspect of the present invention provides a convenient interface allowing the user to predict the selection necessary in order to select a submenu. In this way the selection operation by the user is enhanced because of the ability to predict the selection operation required for the next selection. This is particularly advantageous

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when the selection means comprises keys arranged in a spatial relationship with regard to the spatial arrangement of the menu items.

In accordance with another aspect of the present invention there is provided an input device for inputting instructions or data to an apparatus having display means for displaying a plurality of items corresponding to instructions or data to be input, the input device comprising:

display control means for grouping said items into a hierarchy of sets and subsets and for controlling said display means to display items of alternative sets or subsets of items;

selection means for selecting one of the sets of items, said display control means being operative in response to the selection of one of the sets of items to control said display means to indicate the selectability of the or each item of alternative subsets for the selected set, and said selection means being operable to select any one of said subsets; and

input means for inputting instructions or data in response to the selection of a subset comprising a single item by said selection means.

In an embodiment the sets of items and subsets of items are displayed in a geometrically equivalent manner.

In an embodiment the selection means comprises key means for the selection of corresponding displayed and selectable sets or subsets. The key means can be arranged in a spatial manner related to the spatial arrangement on the display means of corresponding selectable sets or subsets of items. Such an arrangement can

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comprise a touch sensitive display wherein the spatial locations of the currently selectable sets or subsets of items displayed on the touch sensitive display comprises the key means. The key means can comprise a plurality of keys arranged in a layout corresponding to the layout of the currently selectable sets or subsets of items on the display means. Alternatively, the selection means comprises a plurality of keys each labelled to identify the spatial position on the display means where a corresponding selectable set or subset is displayed.

In an embodiment the currently selectable sets or subsets of keys are displayed about an origin and each of the key means is adapted to display a pointer in a direction corresponding to a direction on the display means from the origin to the subset or set to be selected by the key means.

In another embodiment the currently selectable sets or subsets are displayed about an origin and when a set or subset is selected, the subsets of the selected set are redisplayed about the origin. The subsets of a selected set can be redisplayed with the same geometrical distribution about the origin.

Embodiments of the present invention will now be described with reference to the accompanying drawings in which:

Figure 1 is a schematic diagram of apparatus including an input device in accordance with an embodiment to the present invention;

Figure 2 is an illustration of the hierarchical arrangement of the menu items used in a first embodiment of the present invention;

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Figures 3a to 3l illustrate a method of selecting menu items to input data in accordance with a first embodiment of the present invention;

Figure 4 is a flow diagram illustrating the operation of a first embodiment of the present invention;

Figure 5 illustrates a pager incorporating an input device of the first embodiment of the present invention;

Figure 6 illustrates a public information kiosk incorporating an input device in accordance with the first embodiment of the present invention;

Figure 7a illustrates an application of an input device of the first embodiment of the present invention;

Figure 7b illustrates another application of the input device in accordance with the first embodiment of the present invention;

Figures 8a to 8d illustrate the operation of an input device in accordance with a second embodiment of the present invention;

Figure 9a to 9c illustrate the operation of an input device in accordance with a third embodiment of the present invention; and

Figure 10a to 10d illustrate the operation of an input device in accordance with a further embodiment of the present invention.

Referring to Figure 1, an input device 10 of an embodiment of the present invention is illustrated for use in conjunction with a processing unit 4 and a display 5. The input device 10 comprises a user selection device 1 for entering and registering a user's selection of a menu item. The input is received at the input unit 2 which sends a signal to the display controller 3 to update the display 5. If the input selection received at the user selection device 1 comprises an input data unit or

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instruction, the input unit 2 passes this to the processing unit 4 for the processing of the data unit or instruction. The processing unit 4 can then control the display 5 to display the processed data or data process in accordance with the input instruction.

Although in Figure 1 the input device 10 is illustrated as being separate from the display 5 and the processor 4, the input device can incorporate a display for displaying the input data and/or instructions. An example of such an arrangement is a pager, mobile telephone, or PDA which incorporate a small liquid crystal display (LCD).

The operation of a first embodiment of the present invention will now be described with reference to Figures 2 to 4.

Figure 2 illustrates the organisation of input data into a hierarchical tree structure. In this embodiment the data to be input comprises the alphabet A to Z and a space _. In the embodiment of Figure 2 it can be seen that the input data is arranged into a three level tree structure. Thus, in order to select a data item i.e. to navigate to the bottom of the tree, a maximum of three selection operations are required. This is a great improvement over the use of a cursor movable across a display of the possible 27 data units which can be input.

Figure 3 illustrates the operation of the first embodiment wherein the data items are displayed in a menu display area 20 as menu items. Data which is input is displayed in the display area 21. The menu display area 20 displays all of the 27 possible input units in display segments which in this embodiment comprises quadrants of the

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display. The four quadrants comprise the four selectable menu items each of which is displayed as a plurality of subsequentially selectable submenu items. In this embodiment the selection means comprises four keys 22 corresponding to the four quadrants of the menu display area 20.

In order to input the text "CALL" starting at Figure 3a, initially the top left hand key indicated by an arrow is pressed to select the top left hand quadrant of the display menu area 20. The display menu area 20 changes in response to the operation of the key to redisplay the submenus which are now selectable in the four quadrants. Once again it can be seen in Figure 3b that each of the quadrants displays either a selectable data unit comprising a character which in this example is "A" or a selectable submenu. The selection of the top right hand quadrant using the top right hand key in Figure 3b will result in the redisplay of the selected submenu in the menu display area 20 as shown in Figure 3c. As can be seen in Figure 3c this submenu only comprises two submenu items i.e. "B" or "C". Operation of either of the left hand or right hand keys 22 will cause the selection of the appropriate character and in this example "C" is selected using one of the right hand keys. The result of the selection is shown in Figure 3d in which the letter "C" is displayed as input in the display area 21 and the menu display area 20 is reset to display all of the characters which can possibly be input. Selection of the top left hand quadrant then results in the redisplay of the submenu items as shown in Figure 3e. The selection of the top left hand quadrant in Figure 3e result in the character "A" being input as shown in Figure 3f.

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Figures 3g to 3l illustrate similar steps for the selection of the letters "L" and "L" to input the word "CALL".

Figure 4 is a flow diagram illustrating the steps performed in generating input characters. In step S1 the initial menu items are displayed. In step S2 it is determined whether the first key is pressed. If not it is determined whether each of the other keys is pressed and if key N is not pressed (where N = 4 in this embodiment) in step S6 the process returns to step S2 to await the pressing of a key. If in step S2 it is detected that the first key is pressed, it is detected whether there is a submenu i.e. whether it is the last item in the menu. If there is a submenu, in step S4 the displayed menu is updated to display the new submenus which are selectable and the process returns to step S2. If in step S3 the selected item is the last in the menu, the selected item is input in step S5 and the process returns to step S1 wherein the initial menu items are displayed.

The steps S2 to S5 are carried out for each of the keys and are illustrated as steps S6 to S9 for the N^{th} key in this flow diagram.

It can thus be seen in this embodiment that the number of key operations in order to select an item for input is reduced compared to a conventional cursor movement system in which a cursor is moved over a conventional alphabetical or QWERTY keyboard layout. As clearly illustrated in Figure 2 a maximum of three key operations are required in order to select an item for input.

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Although in Figure 2 a particular hierarchical tree structure is illustrated, this is an example only and in practice the tree structure would be optimised such that the most commonly selected items appear at higher levels and the least frequently selected items appear at lower levels. This will further reduce the average number of key operations in order to select an item for input.

Although in this embodiment each time a menu item is selecting having submenu items the submenu items are redisplayed about the same origin i.e. in an enlarged form, this is not essential. In an alternative embodiment the selected quadrant could be highlighted in some way and the selection of submenu items within the quadrant could be enabled.

Further, although in this embodiment all of the possible input items are displayed in the initial menu display, this is not essential and indeed for a menu having a large number of possible input items it may not be possible since the display would have a cluttered appearance and for low resolution displays it may not be possible to display all items. However, at least the next selectable menu items within a menu item will be displayed.

Although in Figure 3a to 3l the use of input keys 22 is illustrated, the menu display area 20 can comprise a touch sensitive display in an alternative embodiment of the present invention. In such an embodiment the selection of a quadrant can take place by the touching of the relevant quadrant.

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Figure 5 illustrates the incorporation of the input device in a pager. In this embodiment the display 13 comprises the menu display area and the input data display area. In addition to the input keys 22 there is provided a cancel key 12 which enables the current menu display area to be reset to the initial menu display and also for the deletion of input characters.

Figure 6 illustrates a further embodiment wherein the input device is incorporated within a public information kiosk.

Figure 7a illustrates yet another embodiment in which the input device is provided in a console 30 separate to a display 40 and connected thereto by a wire 35.

Figure 7b illustrates an alternative embodiment wherein the input device is illustrated as a remote control device 50 for use with a display 40.

In both of these embodiments it can be seen that the input device need not be provided with a display unit and the display unit of a remote apparatus can be used for displaying the menu items to be navigated through.

Figures 8a to 8d illustrate an alternative but similar embodiment of the present invention wherein instead of arranging the menu items in quadrants in a four line type display, the menu items are arranged displayed in a menu display area 25 about an origin 26. Above the menu display area 25 there is an input display area 27 for displaying the input characters which in this example already comprises "THE". In this embodiment four menu items are displayed above, below, to the left, and to the

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right of the origin 26. Each of the menu items is displayed as subsequentially selectable menu items. Each of the menu items can be selected by corresponding keys 28 arranged in a corresponding geometric arrangement.

In Figure 8a the top key indicated by the arrow is selected and as illustrated in Figure 8b the submenu items are redisplayed in the menu item display area 25. The selection of the left key in Figure 8b results in the redisplay of the selected submenu items in the menu display area 25 as shown in Figure 8c. The selection of the right-hand key in figure 8c results in the input of the character "C" as shown in Figure 8d and the menu display area 25 returns to displaying the initial menu.

This embodiment is similar to the first embodiment in that at each level there are a maximum of four possible menu items selectable. The present invention is not however limited to a particular number of selectable menu items and Figures 9a to 9c illustrate another embodiment wherein there are three selectable menu items per level and three corresponding selection keys 41. As can be seen in Figures 9a to 9c the menu display area is triangular with triangular submenu areas. In this embodiment the selection of the top selection key in Figure 9a results in the selection of the top submenu as illustrated in Figure 9b. The subsequent selection of the top key in Figure 9b results in the redisplaying of the menu selection area as shown in Figure 9c. The selection of the top key again will result in the input of the character "A".

Figures 10a to 10b illustrate yet another embodiment of the present invention wherein only two menu items are displayed at each level and two corresponding input keys 51 and 52 are provided. In this arrangement which is illustrated as a PDA, on the display 53 there are illustrated a series of options lying in two display halves. The set or group of options displayed in the top half of the

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display 53 can be selected using the key 51 and as shown in Figure 10b the display 53 is then updated to display the submenu items of the selected menu item. The selection of the key 51 in Figure 10b causes the updating of the display 53 as shown in Figure 10c and the selection of the key 52 in Figure 10c causes the updating of the display as shown in Figure 10d. The selection of the key 51 in Figure 10d results in the selection of option J as an input where option J can comprise an input instruction or input data.

As can be seen in these embodiments the possible input data is organised into sets and subsets in a hierarchical tree structure and each menu item displayed on a display can comprise one or more input data item for instruction. The number of menu items displayed at each level need not be the same as has been illustrated with regard to the first embodiment in which some menu levels have four items and others have two.

Although in the embodiments illustrated the selection means comprises a plurality of keys, the selection means could comprise a composite key such as a "rocker" type switch allowing for a selection of one of the displayed menu items.

It can be seen from the above embodiments that a user interface is provided wherein items can be selected from a menu structure of menus and submenus wherein each menu item is displayed as a plurality of subsequentially selectable submenu items. Such an arrangement allows for a user to predict the subsequent selections necessary in order to select an item.

The present invention is particularly applicable to devices which require instructions or data to be input and which have limited input means. The invention is particularly applicable to input devices in which there are a limited number of input

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keys by associating a particular key with a particular area of the display in which the menu item will be displayed, a simple menu selection arrangement is provided.

Although the present invention has been described here and above with reference to embodiments, the present invention is not limited to the embodiments and modifications within the spirit and scope of the present invention will be apparent to a skilled person in the art.

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CLAIMS:

1. An input device for inputting instructions or data to an apparatus having display means for displaying a plurality of selectable menu items, the input device comprising:

display control means for controlling said display means to display at least one of said menu items as a plurality of subsequently selectable submenu items;

selection means for selecting one of said menu items, said display control means being responsive to the selection of a said menu item displayed as a plurality of subsequently selectable submenu items to control said display means to indicate the selectability of said submenu items, and said selection means being operable for the subsequent selection of one of said submenu items; and

input determining means for determining input instructions or data based on a selected menu item or submenu item.

2. An input device according to claim 1 wherein said input determining means is adapted to determine input instructions or data when one of said menu items or submenu items comprising no subsequently selectable submenu items is selected.

3. An input device according to claim 1 or claim 2 wherein said display control means is adapted to control said display means to display at least one of said submenu items as a plurality of subsequently selectable submenu items.

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4. An input device according to any preceding claim wherein said display control means is adapted to display each menu item and submenu item as a representation of a set of one or more instruction inputs or data inputs.

5. An input device according to any preceding claim wherein said display control means is adapted to control said display means to display all subsequently selectable submenu items for each menu item or submenu item.

6. An input device according to any preceding claim wherein said display control means is adapted to control said display means to display said menu items or submenu items currently selectable at spatially arranged positions, and said selection means is adapted to select respective positions on said display means.

7. An input device according to claim 6 wherein said selection means comprises a plurality of key means operable for the selection of corresponding menu items or submenu items.

8. An input device according to claim 7 wherein said plurality of key means are arranged in a spatial manner related to the spatial arrangement of corresponding said menu items on said display means.

9. An input device according to claim 8 wherein said plurality of key means comprise a touch sensitive display, said spatial locations of the currently selectable menu items or submenu items displayed on said touch sensitive display comprising said key means.

10. An input device according to claim 8 wherein said key means comprise a plurality of keys arranged in a layout corresponding to the layout of said currently selectable menu items or submenu items on said display means.

11. An input device according to claim 7 wherein said key means comprise a plurality of keys, each labelled to identify the spatial position on said display means which is selectable thereby.

12. An input device according to any one of claims 7, 8, 10 or 11 wherein said display control means is adapted to control said display means to display the currently selectable menu items or submenu items about a midpoint, and each of said key means is adapted to display a pointer thereon in a direction corresponding to a direction on said display means from said midpoint to the menu item or submenu item to be selected by said key means.

13. An input device according to any preceding claim wherein said display control means is operative in response to the selection of one of said menu items or submenu items displayed as a plurality of subsequently selectable submenu items to control said display means to highlight said selected menu item or submenu item and to visually indicate that the subsequently selectable submenu items are currently selectable by said selection means.

14. An input device according to any one of claims 1 to 12 wherein said display control means is operable to control said display means to display the currently

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selectable menu items or submenu items about a midpoint, and when a said menu item displayed as a plurality of subsequentially selectable submenu items is selected, to redisplay the submenu items of the selected menu item about said midpoint.

15. An input device according to claim 14 wherein said display control means is operative to redisplay the submenu items of selected menu items with the same geometrical distribution about said midpoint.

16. An input device according to any preceding claim wherein said display control means is adapted to control said display means to display the currently selectable menu items or submenu items in a geometrical arrangement, and to display the subsequently selectable menu items of the or each currently selectable menu items or submenu items in the same geometrical arrangement but in a reduced scale.

17. An input device according to any preceding claim wherein said display control means is operable to control said display means to display said menu items as a hierarchical structure of representations of instruction inputs or data inputs.

18. Apparatus having a user interface allowing a user to select an item from a menu, the interface comprising:

display means adapted to display a plurality of selectable menu items, at least one of said menu items being displayed as a plurality of subsequently selectable submenu items;

selection means for selecting one of said menu items; and

display control means for controlling said display means in response to the selection of a said menu item displayed as a plurality of subsequently selectable menu items to activate the selectability of said submenu items;

wherein said selection means is operable for the subsequent selection of one of said submenu items.

19. Apparatus according to claim 18 wherein said display control means is adapted to control said display means to display at least one of said submenu items as a plurality of subsequently selectable submenu items.

20. Apparatus according to claim 18 or claim 19 wherein said display control means is adapted to control said display means to display all subsequently selectable submenu items for each menu item or submenu item.

21. Apparatus according to any one of claims 18 to 20 wherein said display control means is adapted to control said display means to display said menu items or submenu items currently selectable at spatially arranged positions, and said selection means is adapted to select respective positions on said display means.

22. Apparatus according to claim 21 wherein said selection means comprises a plurality of key means operable for the selection of corresponding menu items or submenu items.

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23. Apparatus according to claim 22 wherein said plurality of key means are arranged in a spatial manner related to the spatial arrangement of corresponding said menu items on said display means.

24. Apparatus according to claim 23 wherein said plurality of key means comprise a touch sensitive display, said spatial locations of the currently selectable menu items or submenu items displayed on said touch sensitive display comprising said key means.

25. Apparatus according to claim 23 wherein said key means comprise a plurality of keys arranged in a layout corresponding to the layout of said currently selectable menu items or submenu items on said display means.

26. Apparatus according to claim 22 wherein said key means comprise a plurality of keys, each labelled to identify the spatial position on said display means which is selectable thereby.

27. Apparatus according to any one of claims 22, 23, 25 or 26 wherein said display control means is adapted to control said display means to display the currently selectable menu items or submenu items about a midpoint, and each of said key means is adapted to display a pointer thereon in a direction corresponding to a direction on said display means from said midpoint to the menu item or submenu item to be selected by said key means.

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28. Apparatus according to any one of claims 18 to 27 wherein said display control means is operative in response to the selection of one of said menu items or submenu items displayed as a plurality of subsequently selectable submenu items to control said display means to highlight said selected menu item or submenu item and to visually indicate that the subsequently selectable submenu items are currently selectable by said selection means.

29. Apparatus according to any one of claims 18 to 27 wherein said display control means is operable to control said display means to display the currently selectable menu items or submenu items about a midpoint, and when a said menu item displayed as a plurality of subsequentially selectable submenu items is selected, to redisplay the submenu items of the selected menu item about said midpoint.

30. Apparatus according to claim 29 wherein said display control means is operative to redisplay the submenu items of selected menu items with the same geometrical distribution about said midpoint.

31. Apparatus according to any one of claims 18 to 30 wherein said display control means is adapted to control said display means to display the currently selectable menu items or submenu items in a geometrical arrangement, and to display the subsequently selectable menu items of the or each currently selectable menu items or submenu items in the same geometrical arrangement but in a reduced scale.

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32. Apparatus according to any one of claims 18 to 31 wherein said display control means is operable to control said display means to display said menu items as a hierarchical structure of representations of instruction inputs or data inputs.

33. An input device for inputting instructions or data to an apparatus having display means for displaying a plurality of items corresponding to instructions or data to be input, the input device comprising:

display control means for grouping said items into a hierarchy of sets and subsets and for controlling said display means to display items of alternative sets or subsets of items;

selection means for selecting one of the sets of items, said display control means being operative in response to the selection of one of the sets of items to control said display means to indicate the selectability of the or each item of alternative subsets for the selected set, and said selection means being operable to select any one of said subsets; and

input means for inputting instructions or data in response to the selection of a subset comprising a single item by said selection means.

34. An input device according to claim 33 wherein said display control means is adapted to control said display means to display said sets of items and said subsets of items in a geometrically equivalent manner.

35. An input device according to claim 34 wherein said selection means comprises a plurality of key means operable for the selection of corresponding displayed and selectable sets or subsets.

36. An input device according to claim 35 wherein said plurality of key means are arranged in a spatial manner related to the spatial arrangement on said display means of corresponding selectable sets or subsets of items.

37. An input device according to claim 36 wherein said key means and said display means comprise a touch sensitive display, spatial locations of the currently selectable sets or subsets of items displayed on said touch sensitive display comprising said key means.

38. An input device according to claim 36 wherein said key means comprises a plurality of keys arranged in a layout corresponding to the layout of the currently selectable sets or subsets of items on said display means.

39. An input device according to claim 33 wherein said selection means comprises a plurality of keys, each labelled to identify the spatial position on said display means where a corresponding selectable set or subset is displayed.

40. An input device according to any one of claims 35, 36, 38 or 39 wherein said display control means is adapted to control said display means to display the currently selectable sets or subsets about an origin, and each of said key means is adapted to display a pointer in a direction corresponding to a direction on said display means from said origin to the set or subset to be selected by said key means.

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41. An input device according to any one of claims 33 to 40 wherein said display control means is operable to control said display means to display the currently selectable sets or subsets about an origin, and, when a said set or subset is selected, to redisplay the subsets of the selected set about said origin.

42. An input device according to claim 41 wherein said display control means is operative to redisplay the subsets of the selected set with the same geometrical distribution about said origin.

43. Apparatus comprising the input device and the display means according to any one of claims 1 to 18 or 33 to 42, wherein the display means is adapted to display the input data or data resulting from the input instructions.

44. Information processing apparatus comprising the input device and the display means according to any one of claims 1 to 18 or 33 to 42, and processing means for receiving the input data or instructions, wherein the display means is adapted to display the input or processed data.

45. An input device substantially as hereinbefore described with reference to and as illustrated in any of the accompanying drawings.

46. Apparatus substantially as hereinbefore described with reference to and as illustrated in any of the accompanying drawings.

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The Patent Office

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Application No: GB 9726278.6
Claims searched: All

Examiner: R F King
Date of search: 22 December 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): G4A[AKS]; G4H[HKK]; H4T[TBLA, TBLC, TBLM]

Int Cl (Ed.6): G06F 3/023, H03M 11/04

Other: ONLINE: WPI, INTERNET.

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	Hierarchical pop-up/pull-down menus eg p101, 'Performer Getting Started', Mark of the Unicorn, Inc.	1, 18, 33

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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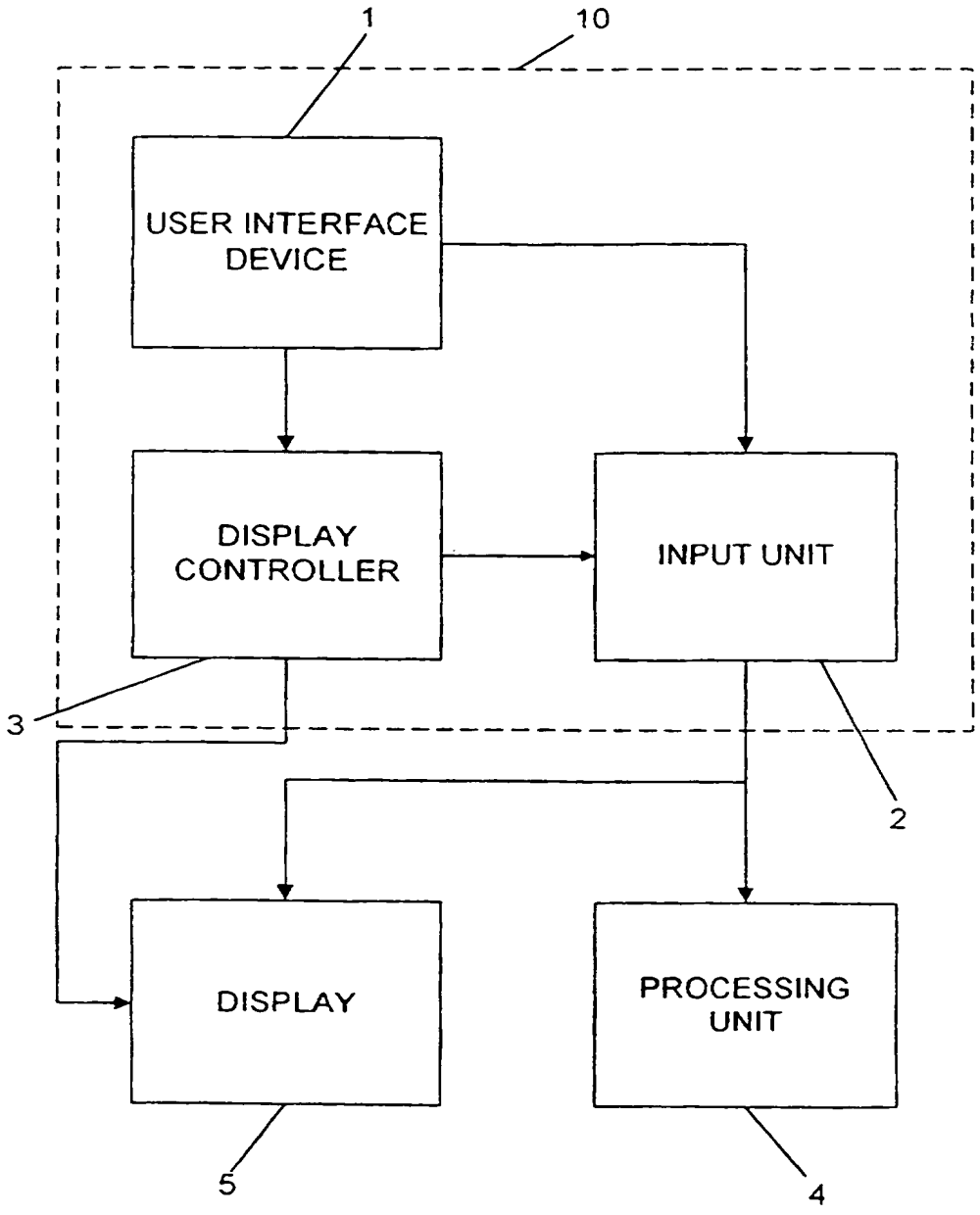

Fig 1

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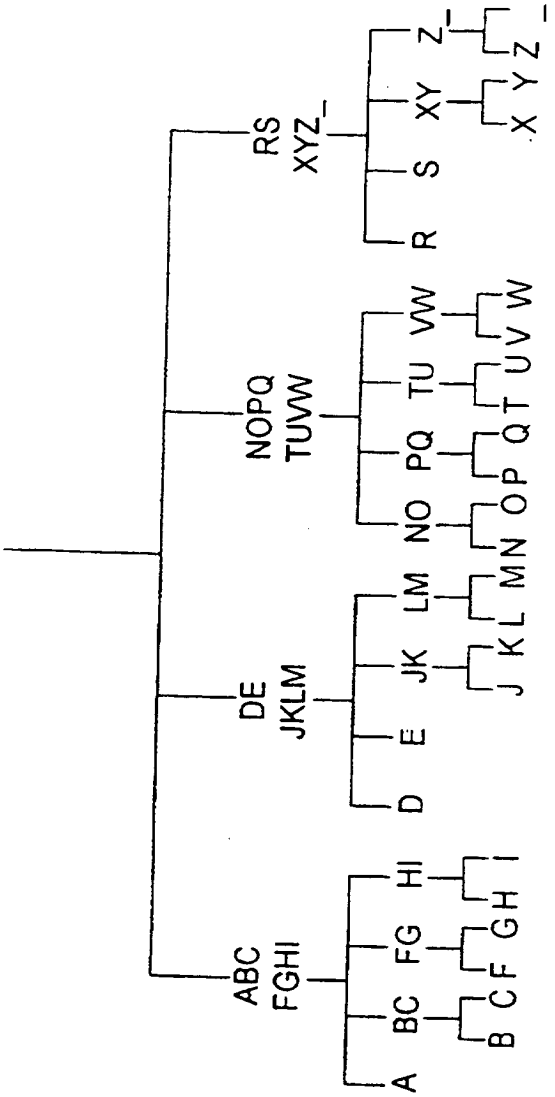

Fig 2

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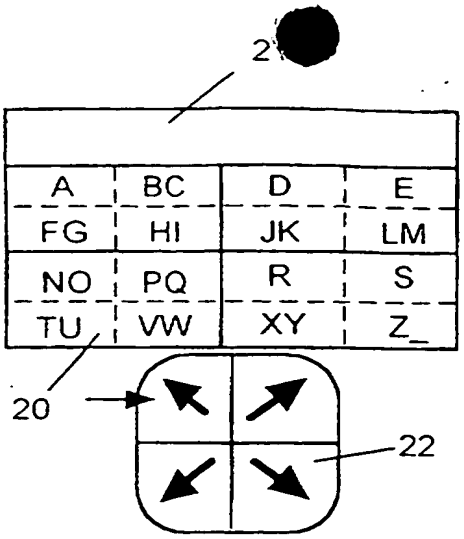


Fig 3a

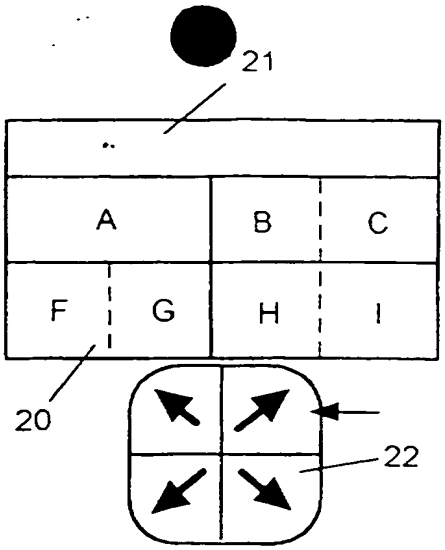


Fig 3b

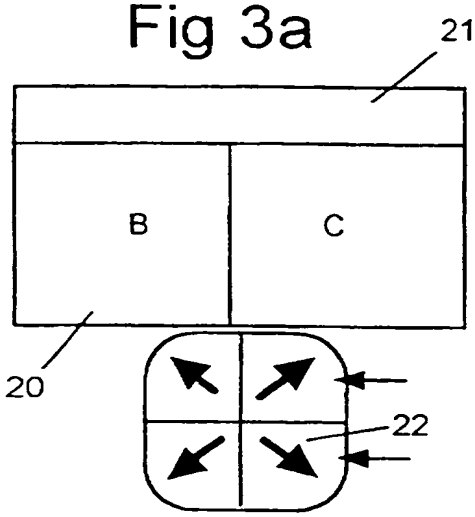


Fig 3c

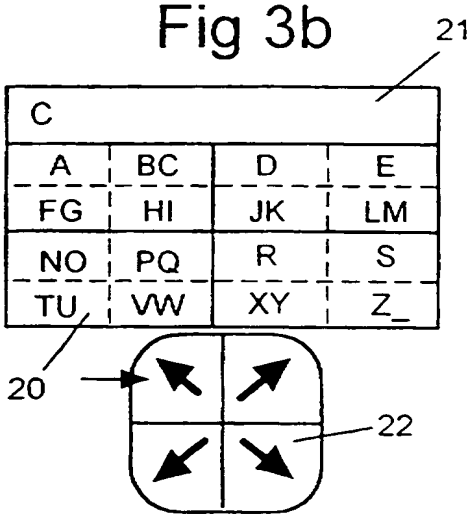
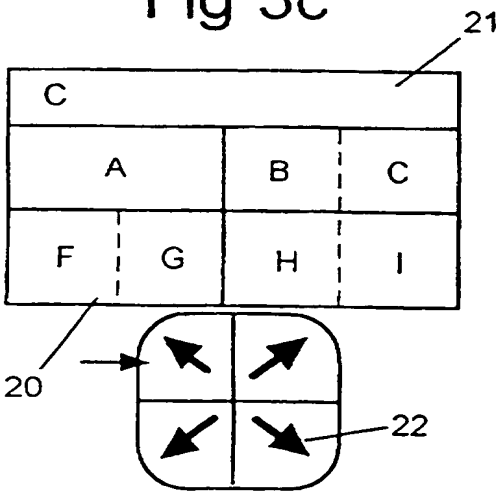


Fig 3d



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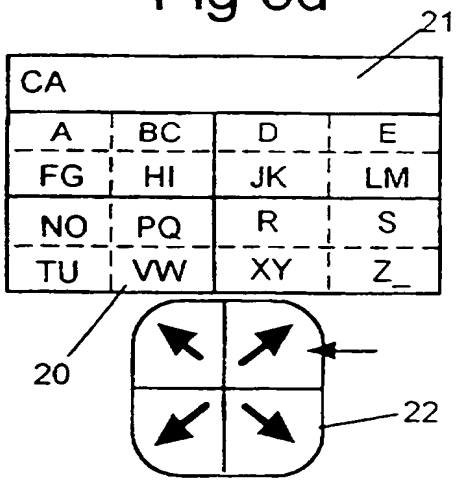

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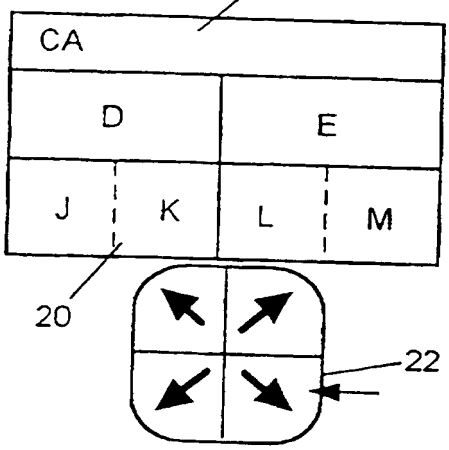
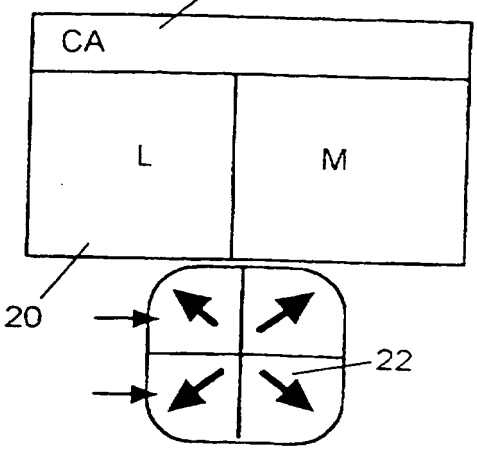


Fig 3g



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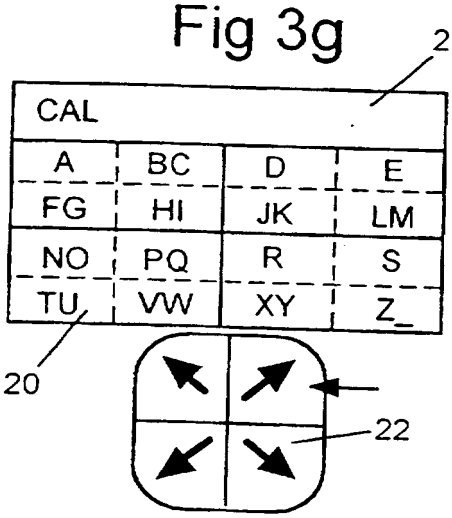
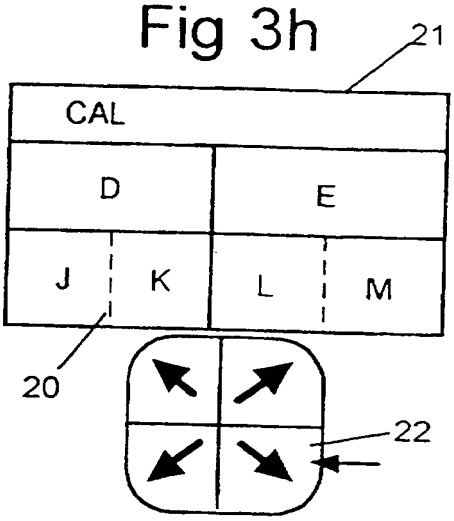


Fig 3i



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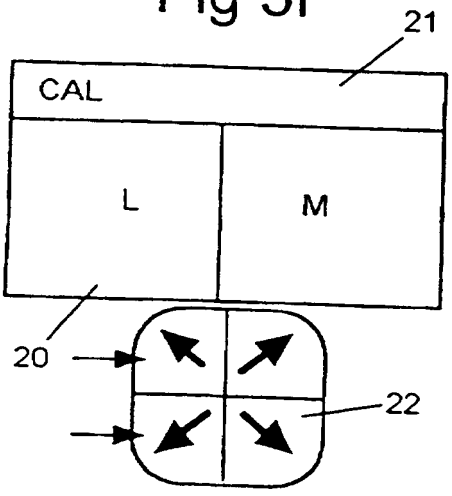

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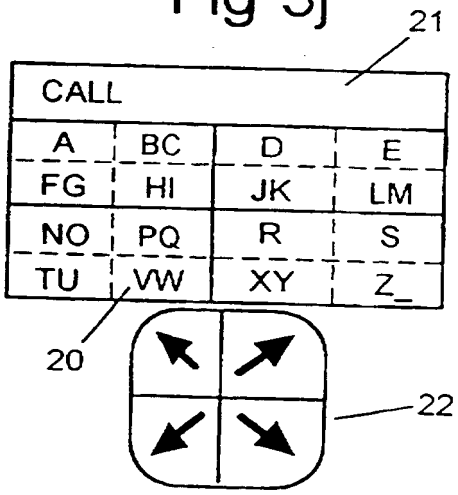

Fig 3l

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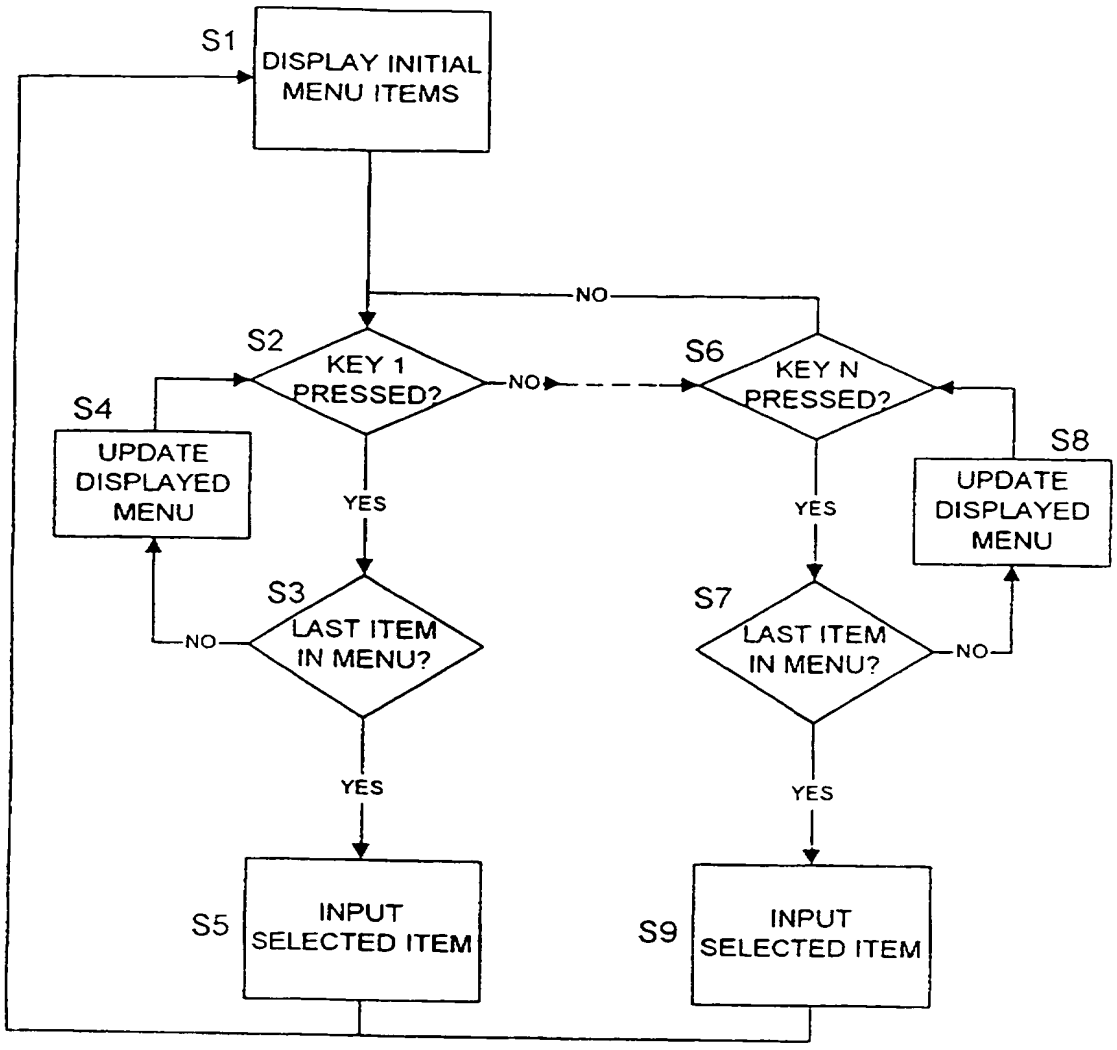

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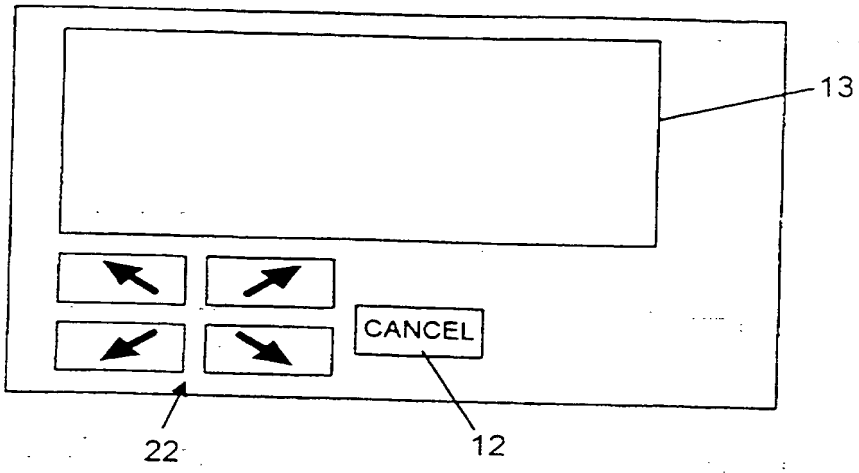
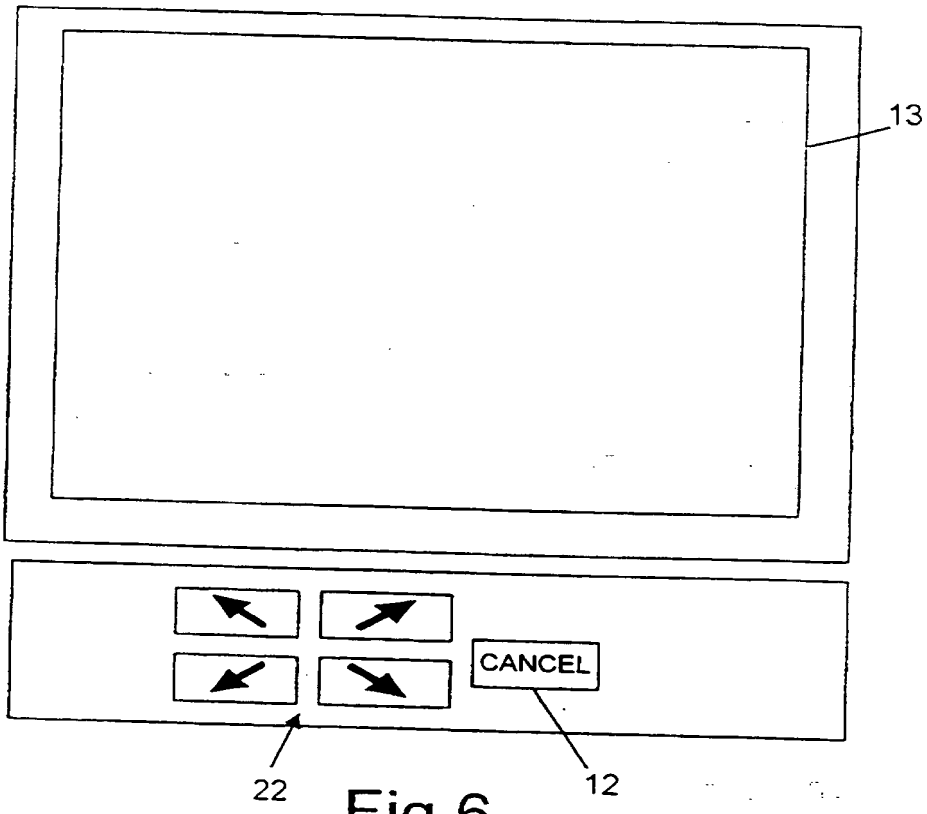


Fig 5



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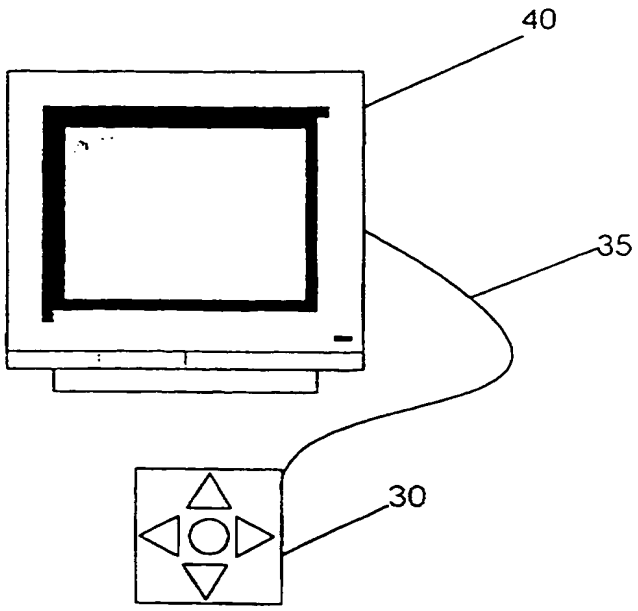

Fig 7a

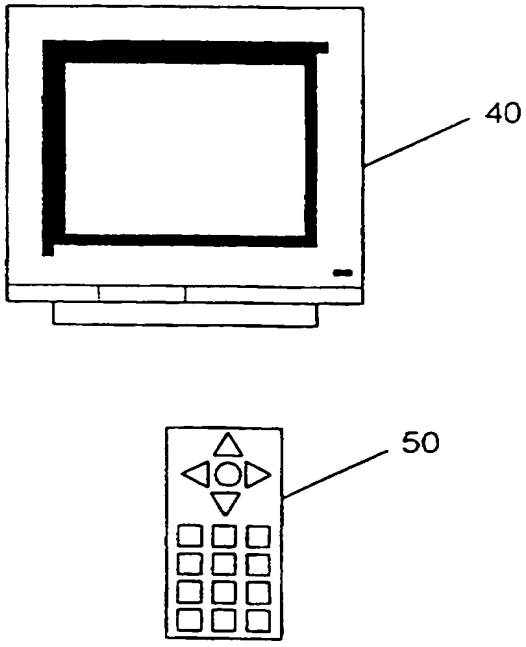

Fig 7b

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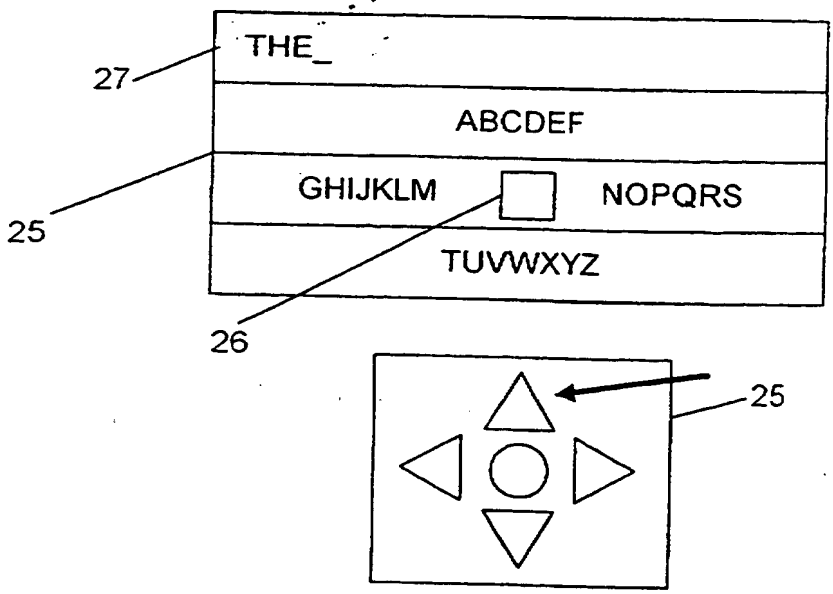

Fig 8a

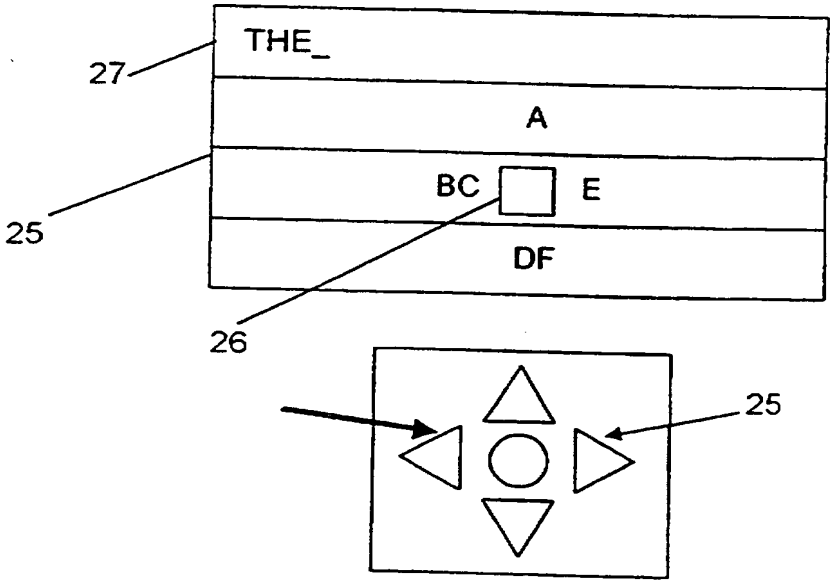

Fig 8b

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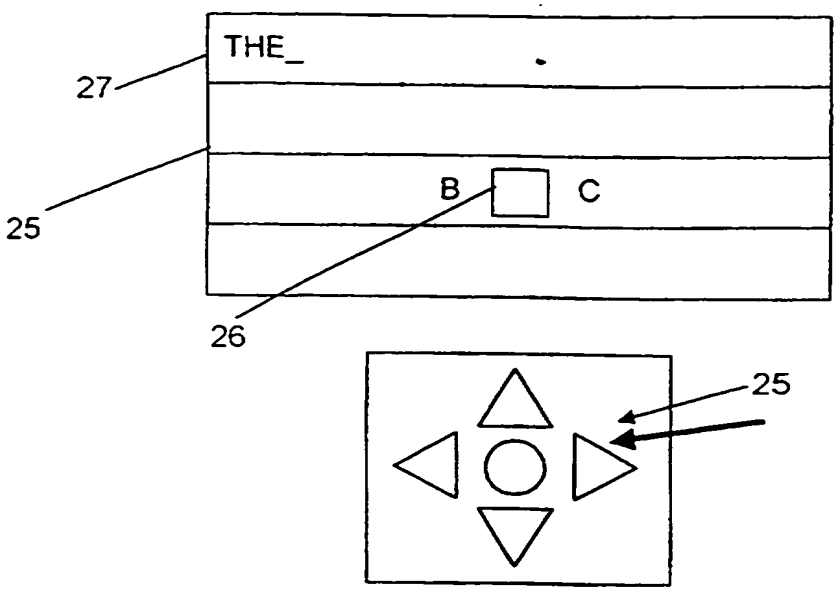

Fig 8c

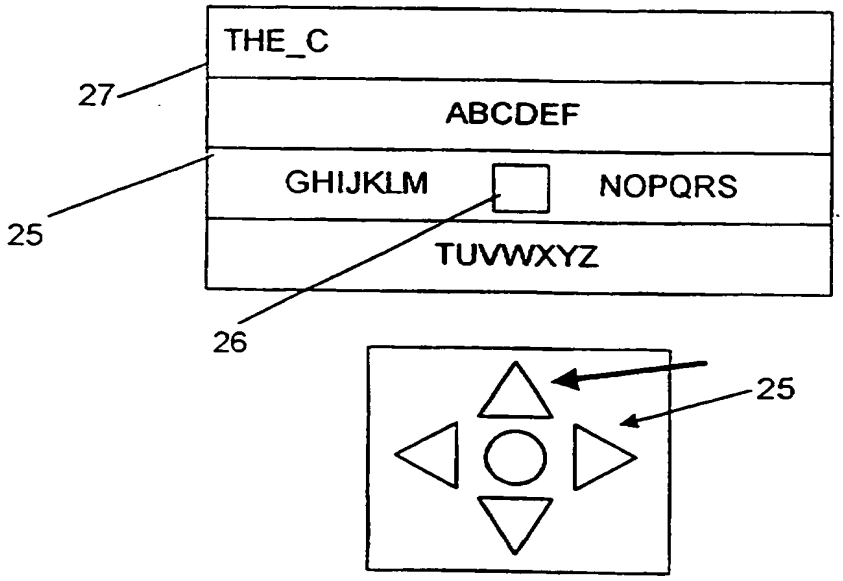

Fig 8d

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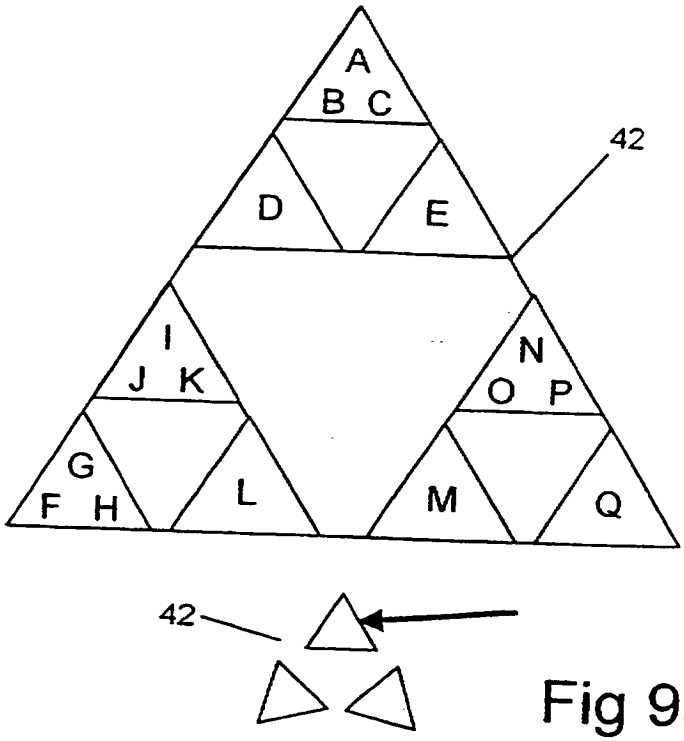

Fig 9a

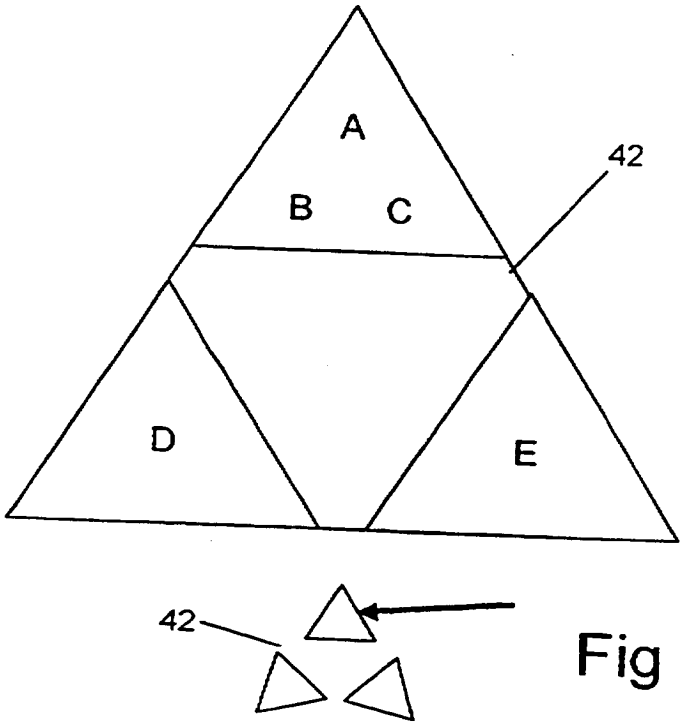

Fig 9b

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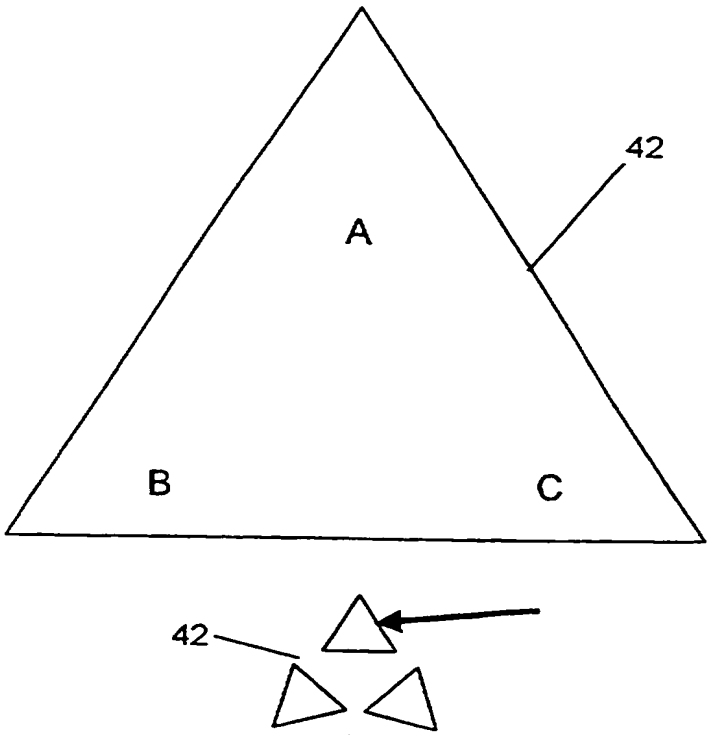

Fig 9c

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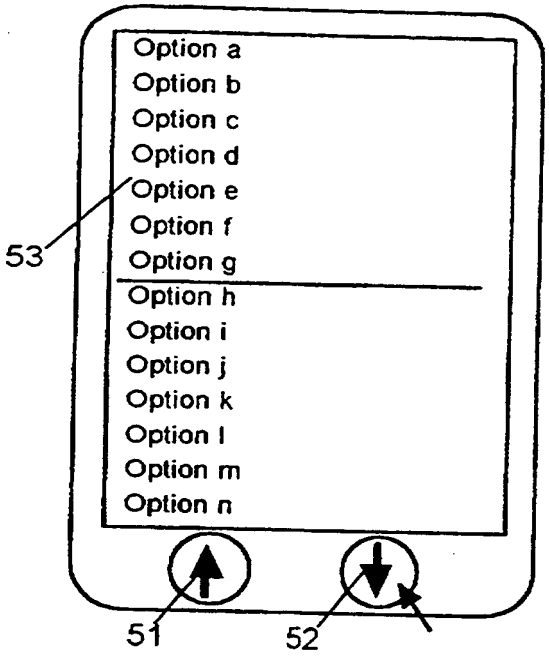

Fig 10a

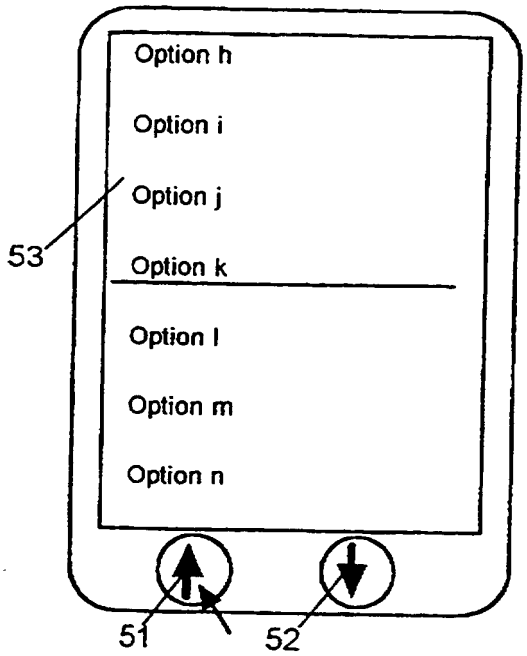

Fig 10b

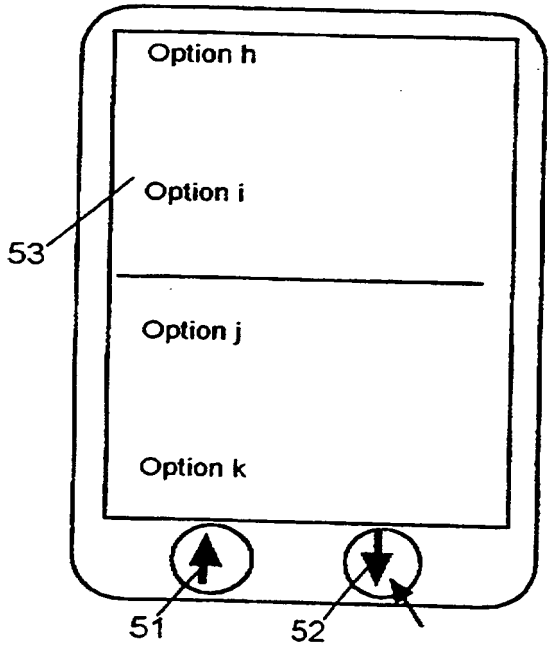

Fig 10c

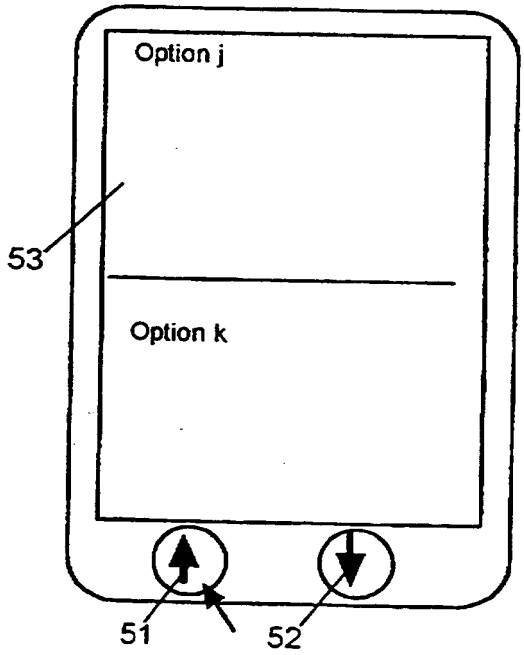

Fig 10d

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